[Froissart reading to the Count of Foix after supper.]

FROISSART AND HIS CHRONICLE.

No. X.

FROISSART AT THE COURT OF GASTON DE FOIX.

The historian arrived at Orthes in the autumn of 1388, and was well received by the count, who, as soon as he saw him, bade him be of good cheer, and, smiling, told him he knew him well, though he had never seen him before—alluding, of course, to his writings. And so he retained him in his household, as Froissart had hoped he would; and for the twelve weeks the latter stayed at Orthes, he had evidently a very pleasant time of it. Not only did he obtain more historical matter than he had even expected, but a world of information besides, illustrative of the acts, feelings, and superstitions of the chivalry he so loved, and which are among not the least interesting part of Froissart's book. Here he is told of the death of Sir Peter Ernaut, a knight of Gaston de Foix's blood and country, who was killed by Gaston because he would not deliver up to him a castle intrusted to him by the English; of the strange malady which seized Sir Peter of Bearn, through a struggle with a bear, who was always getting up in the night to arm himself, and in that state and fast asleep wandering about the house seeking something or somebody to fight; and many other strange and wonderful relations, in some of which Froissart shows that he partook of the general credulity of the age. Whilst he was at Orthes two events also occurred,—the treaty of marriage of the Duke of Berry to Count

de Foix's cousin and ward, the daughter of the Count of Boulogne, in whose train Froissart departed from Orthes; and the meeting of Count de Foix and his suzerain (for a portion of his lands), Charles VI. of France. But the most valuable passages of this visit are perhaps those relating to the count himself. In Froissart's account of Gaston de Foix we have by far the most perfect picture of a wealthy and noble knight of the middle ages that can be found in any ancient writings. It is at once minute and picturesque, equally admirable as the picture of an individual and of a class. Gaston it appears, among his other accomplishments, included a love of literature, to which circumstance Froissart attributes his own honourable reception. "The acquaintance of him and of me was because I had brought with me a book, which I made at the contemplation of Winceslaus of Bohemia, Duke of Luxembourg and of Brabant, which book was called Meliador,' containing all the songs, ballads, rondeaux, and virelays, which the gentle duke had made in his time, which by imagination I had gathered together; which book the Count of Foix was glad to see. And every night after supper I read therein to him; and while I read there was none durst speak any word, because he would I should be well understood, wherein he took great solace. And when it came to any matter of question, then he would speak to me, not in Gascon, but in good and fair French. And of his estate and house I shall somewhat record, for I tarried there so long that I might well perceive and know much.

"This Earl Gaston of Foix with whom I was, at that time he was of a fifty years of age and nine; and I say I have in my time seen many knights, kings, princes, and others, but I never saw none like him of personage, nor of so fair form, nor so well made; his visage fair, sanguine, and smiling; his eyes grey and amorous, whereas he list to set his regard. In everything he was so perfect, that he cannot be praised too much; he loved that ought to be loved, and hated that ought to be hated. He was a wise knight, of high enterprise, and of good counsel; he never had miscreant with him; he said many orisons every day, a nocturn (night-prayer) of the Psalter, matins of our Lady, of the Holy Ghost, and of the cross, and dirge every day. He gave five florins in small money at his gate to poor folks for the love of God. He was large and courteous in gifts. He could right well take where it pertained to him, and to deliver again whereas he ought. He loved hounds, of all beasts, winter and summer. He loved hunting. He never loved folly, outrage, nor foolish largess; every month he would know what he spended. He took in his country to receive his revenues and to serve him notable persons; that is to say, twelve receivers, and ever from two months to two months two of them should serve for his receipt; for at the two months' end he would change and put other two into that office, and one that he trusted best should be his comptroller, and to him all other should account, and the comptroller should account to him by rolls and books written, and the accounts to remain still with the earl. He had certain coffers in his chamber, out of the which ofttimes he would take money to give to lords, knights, and squires, such as come to him; for none should depart from him without some gift; and yet daily multiplied his treasure to resist the adventures and fortunes that he doubted. He was of good and easy acquaintance with every man, and amorously would speak to them. He was short in counsels and answers. He had four secretaries, and at his rising they must ever be ready at his hand without any calling; and when any letter were delivered him, and that he had read it, then would he call them to write again, or else for some other thing. In this estate the Earl of Foix lived. And at midnight, when he came out of his chamber into the hall to supper, he had ever before him twelve torches burning, borne by twelve varlets, standing before his table all supper: they gave a great light, and the hall [was] ever full of knights and squires, and many other tables [were] dressed to sup who would. There was none should speak to him at his table, but if he were called. His meat was lightly, wild fowl, the legs and wings only; and in the day he did but little eat and drink. He had great pleasure in harmony of instruments; he could do it right well himself: he would have songs sung before him. He would gladly see conceits and fantasies at his table; and when he had seen it, then he would send it to the other tables bravely: all this I considered and advised." Froissart says, briefly, "he loved hunting;" but we must add that the count's love was positively a passion. One author says he had no fewer than sixteen hundred dogs; and we know that he was the author of a book on hunting which went through several editions in the early days of the press. It was on his return from a bear-chase in 1391 that he died of apoplexy, whilst his attendants were pouring water in his hands.

Among the remarkable stories which Froissart was told at the castle of Orthes during this memorable visit was one of a highly imaginative character, which illustrates a noticeable trait of the time, its superstitious credulity. The Count of Foix was a politic prince as well as a brave and accomplished knight, and with admirable skill maintained his rights and influence amidst difficult circumstances. His neighbours on all sides—France, Spain, the Low Countries, all were in a continual state of warfare, either in their own respective dominions, or with each other, or with England; and it required quite as much intellectual as physical power to remain safe amidst all their marches and countermarches, their treaties and their alliances, their quarrels and their wars. He was in the habit it seems of receiving constantly from all parts, by paid messengers, intelligence of whatever was stirring in the political world, and the excellence of his arrangements in this matter produced such marvellous results to those who were ignorant of the means, that magic as usual was called in to explain the mystery: and we learn from Froissart's relation that his own household participated in the belief of the truth of the explanation. The historian, one day being witness to some marvellous exhibition of knowledge thus acquired, was very earnest with one of the count's squires to state his opinion about it; and, on a promise of secrecy whilst remaining in the country, was successful. The squire drew him apart into a corner of the chapel at Orthes, and there told him the following story:—

The lord of Corasse in that country had some twenty years before had a quarrel with a clerk-curate on account of the tithes of the town of Corasse, to which each laid claim. The Pope's judgment was sought, and a decision obtained in favour of the curate; but the lord of Corasse told the latter, notwithstanding, that if he meddled with the property in question it should cost him his life. Deterred by his threats, the curate left the country, warning the lord at the same time that he would send him a champion whom he should fear. About "three months after, as the knight lay on a night-bed in his castle of Corasse, with the lady his wife, there came to him messengers invisible, and made a marvellous tempest and noise in the castle;" and the next morning the servants came to him full of alarm at what they had heard. "The next night there was a great noise and greater, and such strokes given at his chamber door and windows, as all should have been broken in pieces." In answer to the knight's queries, he learns that the terrible visitor is *Orthon*, a spirit sent by the curate to trouble him till

he has made restitution. The knight speaks kindly to the spirit, and prays him to leave the clerk, and come and serve him; and the spirit, "a love with the knight," agrees; and thenceforth "the lord of Corasse knew by Orthon everything that was done in any part of the world;" and as he was accustomed to impart to the Count of Foix whatever news Orthon had brought him, the count soon perceived that no ordinary agencies were at work; and, on examining his informant "straightly," was told the truth. Gaston's curiosity being roused, he asked the lord of Corasse if he had ever seen his messenger: "Nay, surely, sir," quoth the knight, "nor I never desired it." The count, however, induced him to promise to make an attempt to see what "form and fashion" it was of. "And so on a night, as he lay in his bed with the lady his wife, who was so inured to hear Orthon that she was no more afraid of him, then came Orthon and pulled the lord by the ear, who was fast asleep, and therewith he awoke, and asked who was there? 'I am here,' quoth Orthon. Then he demanded, 'From whence comest thou now?'

'I come,' quoth Orthon, 'from Prague, in Bohemia.'

'How far is that hence?' quoth the knight.

'A threescore days' journey.'

'And art thou come thence so soon?"

'Yea, truly,' quoth Orthon, 'I come as fast as the wind, or faster.

'Hast thou then wings?" quoth the knight.

'Nay, truly.'

'How canst thou then fly so fast?"

'Ye have nothing to do to know that,' quoth Orthon.

'No,' quoth the knight; 'I would gladly see thee, to know what form thou art of.'

'Well,' quoth Orthon, 'ye have nothing to do to know; it sufficeth you to hear me, and I to show you tidings.'

'In faith,' quoth the knight, 'I would love thee much better an I might see thee once.'

'Well, sir,' quoth Orthon, 'since ye have so great desire to see me, the first thing that ye see tomorrow when ye arise out of your bed, the same shall be I.'" In the morning the knight "arose fair and easily out of his bed, and sat down on his bed-side, weening to have seen Orthon in his own proper form; but he saw nothing whereby he might say,—'Lo! yonder is Orthon!' So that day passed and the next night came; and when the knight was in his bed, Orthon came and began to speak, as it was accustomed. 'Go thy way,' quoth the knight, 'thou art but a liar. Thou promisedst that I should have seen thee, and it was not so.'

'No?' quoth he; 'and I showed myself to thee.'

'That is not so,' quoth the lord.

'Why,' quoth Orthon, 'when you rose out of your bed, saw you nothing?' Then the lord studied a little, and advised himself well. 'Yes, truly,' quoth the knight; 'now I remember me, as I sat on my bed's side, thinking on thee, I saw two straws on the pavement, tumbling one upon the other.'

'That same was I,' quoth Orthon, 'into that form did I put myself as then.'

'That is not enough to me,' quoth the lord: 'I pray thee put thyself into some other form, that I may better see and know thee.'

'Well,' quoth Orthon, 'ye will do so much that ye will love me, and I go from you, for you desire too much of me.'

'Nay,' quoth the knight, 'thou shalt not go from me; let me see thee once, and I will desire no more.'

'Well,' quoth Orthon, 'ye shall see me to-morrow; take heed, the first thing that ye see after ye be out of your chamber, it shall be I.'

'Well,' quoth the knight, 'I am then content; go thy way, let me sleep.' And so Orthon departed. And the next morning the lord arose, and issued out of his chamber, and went to a window and looked down into the court of the castle, and cast about his eyes. And the first thing he saw was a sow, the greatest that ever he saw; and she seemed to be so lean and evil-favoured that there was nothing on her but the skin and the bones, with long ears, and a long lean snout. The lord of Corasse had marvel of that lean sow, and was weary of the sight of her, and commanded his men to fetch his hounds, and said, 'Let the dogs hunt her to death and devour her.' His servants opened the kennels and let out his hounds, and did set them on this sow. And at the last the sow made a great cry, and looked up to the lord of Corasse as he looked out at a window, and so suddenly vanished away, no man wist how. Then the lord of Corasse entered into his chamber right pensive, and then he remembered him of Orthon his messenger, and said, 'I repent me that I set my hounds on him; it is an adventure an I ever hear any more of him; for he said to me oftentimes that if I displeased him I should lose him.' The lord said truth, for never after he came into the castle of Corasse; and also the knight died the same year next following."

"Is the Earl of Foix served with such a messenger?" asks Froissart at the conclusion of the tale. "Surely," quoth the squire, "it is the imagination of many."

On Pruning Trees.—Mr. Thomas Baylis, who is well acquainted with the nature of trees, and by whom my attention was first directed to the baneful effects of pruning, planted a bed of about five hundred pear-trees, at Ledbury, in the county of Hereford. Sixty of these trees were left entirely unpruned; all the others were pruned, with naked stems, as trees generally are in nurseries. The sixty unpruned trees had no advantage in soil or situation; yet on an average their growth in a few years was at least three times greater than that of the pruned trees. The unpruned trees were much better formed for transplanting into orchards than the pruned ones; their stems were furnished with strong thorny branches: these branches, in addition to the other good offices they had performed and were performing to enable the tree to outgrow the pruned ones so far, made excellent natural fences for each against injury from cattle. It is not my intention to enter into an argument about the management of fruit-trees; this experiment with the pear-trees is only mentioned to show that the opinion that pruning decreases the quantity of growth has been confirmed by experiment; but I cannot refrain from stating my regret at the present deplorable state of the orcharding in this county. The great ignorance of the nature of trees displayed in the management of apple and pear trees almost dismays me in the attempt to point out the errors that are fallen into by the cultivators of timber-trees. The apple and pear trees in this county are generally rendered fruitless at an early age through ill treatment. The apple-tree in particular dies overpowered by the numerous injuries inflicted on it by its misjudging and officious cultivators. At a time of life when it should be in its greatest prosperity, it is falling to pieces with premature old age; its limbs are, one after the other, blown from its rotten trunk; and it may truly be said that the apple-tree seldom dies a natural death, its death being generally occasioned by an accumulation of injuries. Whenever a tree has a live spray cut from it, an injury is inflicted on that tree that never can be entirely repaired. Every wound received is stored up; and if wounds be continually added, they will accumulate to a degree too great to be borne, and the tree will sink under its infirmities.—*Treatise on the Nature of Trees, &c., by Stephen Ballard.*—[We give this extract as stating a fact, in exemplification of a theory supported by the author as to the prejudicial effects of pruning, without at all adopting that theory. The subject is certainly interesting, for there is no doubt that pruned apple and pear trees are constantly subject to early disease and premature decay, while the untrimmed crab remains healthy and grows old. Pruning will probably be found to be more applicable to certain kinds of trees and to certain situations than to others, and will require much observation and recorded experience to reduce it to a system. The view here taken, though not common, is by no means singular, but is supported by some good authorities. The subject certainly deserves attention.]

[West Front of Cologne Cathedral, as it is intended to be completed.]

COLOGNE CATHEDRAL.

[Continued from page 445.]

THE Cathedral is itself so magnificent and on so large a scale, being four hundred feet long and one hundred and sixty-one broad, that, when contemplating its grandeur as a work of art, we almost forget the shrines and relics which it contains, though some of the former are curious and interesting. The shrine of the Three Kings of Cologne is in a small marble chapel, in the Ionic style, behind the high altar. These kings, as tradition reports, were the Magi who came from the East to bring presents to the infant Saviour. The emperor Frederic Barbarossa brought their bones from Milan after taking that city by storm in 1170. They are placed in a case of solid silver. The skulls, which are the only parts that remain, were once crowned with golden diadems enriched with jewels. Each skull is inscribed with a name written in rubies, —Gaspar, Melchior, and Balthazar. The shrine of the "Three Kings of Cologne" was once the most famous in Christendom, and was profusely adorned with precious stones. In 1794 these relics were carried off by the chapter to Arenberg, in Westphalia, to prevent their seizure by the French. They were brought back in 1804, but in the mean time some of the precious stones were taken away: imitations in paste or glass have been substituted, and the crowns of the Three Kings are now of silver gilt. There still remains a display of stones, gems, cameos, and enamel-work sufficient to show the former richness of the shrine. Amongst the other objects of interest in the cathedral are the silver coffin of St. Engelbert and some fine monuments, several splendid painted windows, a beautiful altar-table, rich candelabra, curious tapestry, and a singular painting, with the date of 1410, representing the Patron Saints of Cologne. The sacristans profess to show one of the bones of St. Matthew. But to return to the edifice itself.

Vogt, an accurate writer on Rhenish history, gives the following account of the original design:—"It was (he says) designed to form a Latin cross, the length of which, from east to west, should be four hundred feet, and the width two hundred feet. Over the intersection of the arms of this cross it was contemplated to erect a cupola of the largest possible size. At the western extremity there were to have been two enormous towers, each of five stories high; the several stories to be supported upon curious pillars, and the towers to be surmounted with pointed spires of finely carved fret-work. The lower story of each

hall was designed to form an ante-hall or porch to the two main entrances of the church. At the lateral extremities of the cross, in the northern and southern sides of the building, there were to be also two grand entrances. Four hundred and sixty ponderous pillars, ranged in double rows from east to west, were destined to support the immense roof; and an equal number of pilasters, to correspond with them, were to be inserted in the side-walls of this transcendant edifice. Each pillar was to be of a different design from its fellow, and no one of the pilasters was to be of the same form as the other." The projector of the noble structure was Engelbert the Holy. He was Archbishop of Cologne, and Count of Berg in his own right, in 1220. The edifice was commenced in 1248. It is singular that the name of the architect is altogether unknown,* and fanciful legends have been related to account for this unusual circumstance: they may be seen in Mr. Snowe's 'Legends of the Rhine.'

Merian, the old local historian of Cologne and its sister Roman colonies, mentions the plan adopted for the completion of the building:—"It was made a custom of the state that every new archbishop should add a portion of the original design to that which had already been erected before him; to the end that, in the course of years, the whole edifice might be completed: and this good custom was long complied with. But in the end it fell into disuse, owing to the local troubles which first broke out between the archbishops and the citizens, and then to the troubles which affected Germany in general up to the period of the Reformation. Thus this noble monument of religion and of art still remains in an unfinished condition." Schreiber, describing its recent state, says,—"The two towers, which were intended to be five hundred feet high, remain unfinished; the northern one is not more than twenty-one feet above the ground, and the other is little more than half the intended height. Only the choir of the church and the chapels surrounding it have been finished. The columns in the nave of the church terminate at a ceiling composed of simple planks covered with slates." That competent critic, the late Mr. Hope, author of the 'History of Architecture,' speaking of the unfinished choir, which is one hundred and eighty feet high, says it resembles a splendid vision, "from its size, height, and disposition of the pillars, arches, and beautifully coloured windows." The external parts did not less excite his admiration. "The double range of stupendous flying buttresses, and of intervening piers, bristling with a forest of purfled [ornamented] pinnacles, strike the beholder with awe and astonishment." He adds that this edifice, "if completed, would have been at once the most regular and most stupendous Gothic monument existing;" or, as the author of one of Mr. Murray's excellent Hand-books for Tourists says, "the St. Peter's of Gothic architecture."

Many princes have sought at various periods to complete the building of the cathedral, but the work was too great for the times in which they lived, and still it remained in a condition between a fragment and a ruin, baffling the desires of those who wished to see the last stone finished of so grand a monument of man's intellect and industry. For many years the late King of Prussia advanced large sums towards the repair and maintenance of the choir. To his son, the present king, has devolved the more gratifying duty of commencing in earnest the completion of the entire design. The first stone of the new works for finishing the structure was laid by him with much ceremony on the 4th of September, 1842. All Germany has taken an interest equally enlightened in this great object. The King of Prussia has pledged himself to supply a large annual sum for this purpose; other princes have followed his example; and private subscriptions have been raised to aid the undertaking, not only in Germany, but in other parts of the Continent. The architect, M. Zwirner, calculates that a sum equal to 720,000*l.* will be required, and that the work will occupy about thirty years. Let us hope that no new outburst either of civil faction or foreign hostility will once more cause the builders to suspend their labours. At the moment when the King of Prussia took the mallet in his hand, the ancient crane on the top of the south tower was once again seen in motion, slowly raising a ponderous stone, while a thousand acclaiming voices hailed with enthusiasm this interesting event.

His majesty's speech on the occasion, omitting a brief introduction, was as follows:—"Gentlemen of Cologne, a great event is about to take place among you. Your feelings will tell you that it is no common edifice you are about to erect. It is the offspring of the spirit of union and concord among Germans of every creed. When I reflect on this, my eyes are filled with joyful tears; and I thank God that I have lived to witness this day. Here, where this foundation-stone is laid, rearing their heads with yonder towers, will arise the noblest portals in the whole world. Germany builds them: may they, by the grace of God, be to her the entrance gates to a new, a great, and a happy future! Far from them be all that is anti-German—that is to say, all that is base, false, and insincere. May this portal of honour never be disgraced by bad faith, or by the unworthy disunion of German princes or of the German people. May the spirit which would disturb the peace of creeds, or impede the progress of social order—that spirit which once interrupted the building of this house of God, and injured the well-being of our common fatherland—find no entrance here. The feeling that has prompted the building of these portals is the same that twenty-nine years ago made us break our chains, and banish insult from our native land and division from its shores; it is the same spirit which, fortified by the blessing of my departed father (the last of the three great monarchs), two years ago, displayed itself with a vigour undiminished in strength and unimpaired by time; is is the spirit of German union and of German power; and oh! may the portals of Cologne cathedral be its most glorious triumph! May the spirit which has given birth to this great work serve to complete it: and may it prove to remote generations that Germany is great and mighty by the union of her rulers and her people, and that she has without bloodshed consolidated the peace of the world! May it attest that Prussia is happy in the glory and prosperity of her own father-land, and in the fraternization of her different religious creeds, all one and alike in the eyes of the Divine Creator. I pray to God that the cathedral of Cologne may continue to tower above this town and all Germany, and that it may be a witness of peace and happiness among mankind until time shall be no more. Gentlemen of Cologne, your city has by this structure obtained a high pre-eminence over all the other towns of Germany: she has this day proved herself worthy of that pre-eminence. Join then with me as I strike the trowel on the foundation-stone: shout with me your rallying-cry of ten centuries—'*Alaaf Cologne!*'"

* In the 'Art-Union' for November it is stated that the honour of giving birth to the architect of the cathedral belongs to Belgium; a charter having been discovered, dated 1257, showing that the monks of Cologne, in consideration of the services performed by Master Gerard, of St. Trond ('Gerardus de Sancto Trudone'), who directed the construction of their cathedral, had assigned to him a certain estate of land. We do not know what credit is due to this statement; but in the Valhalla, just opened by the king of Bavaria, there is a monument to the unknown architect of Cologne Cathedral.

TIME.

[Abridged from the 'Penny Cyclopædia.']

THIS word may be considered either with reference to our abstract idea of the thing signified by it, or to the measures of it which have been contrived for use in the business of life.

When we think of time in the usual manner, it is of a real thing external to ourselves which we cannot help imagining to have an existence and a measure, both of which would remain, though those who now speculate upon the conception were annihilated. A little more consideration shows that we are indebted for the idea to successions of observed events, or at least for the power of applying the idea to external objects. No description can be adequate; if we say that *change* necessarily implies *time*, and that the perception of that which *is*, being different from that which *was*, suggests the notion of an interval, we see that we have already fully assumed the idea of time in the words *is* and *was*. But we may say that space and the objects which fill it exist independently of ourselves, and would undergo changes though we were not in existence to perceive them, and that therefore the times which those changes require would also exist; this involves the whole of the most abstruse part of metaphysics, and is much beyond the scope of our article. We shall therefore turn to the mode of measuring time; we have a thorough conviction that time is a magnitude, that is, has its *more* and *less*. We must ask ourselves in the first instance what we mean by a greater or a smaller time.

In the perception of time as a magnitude, that is, of intervals of time as containing more or less of duration, we refer in the first instance to a habit derived from continual acquaintance with those great natural successions on which the usual actions of our lives depend, with which we can constantly, though unconsciously, compare the duration of our thoughts and actions. There is no more an absolutely long or short time than there is an absolutely great or little space; these words are only comparative. If, for example, any one were to affirm that the universe was continually growing less and less, all its parts altering in the same proportion, and the dimensions of the human race with the rest, in such manner that the whole solar system would now go into a nut-shell, such as nut-shells were a thousand years ago, it would be impossible either for him to prove it, if true, or for any one else to prove the contradiction, if false. In like manner, if any one were to say that the revolutions of all the heavenly bodies were continually accelerating, but that the properties of matter were also continually altering, and the speed with which ideas are formed and communicated, and muscular efforts made, continually increasing, it would be impossible to prove a contradiction. The oriental story is the best illustration of this:—A prince was ridiculing the legend of Mohammed being taken up by an angel, and holding many long conferences with his Creator, and having many views of heaven and hell to the smallest details, in so short a time, speaking with reference to things upon earth, that, on his being brought back, the water had not quite flowed out of a jug which he had dropped from his hand when the angel caught him. A magician at the court of this prince checked his laughter by offering to prove the possibility of the story, if his highness would only dip his head into a basin of water. The prince consented, and, the instant his head was immersed, found himself lying by the sea-shore in a strange country. After a reasonable quantity of malediction upon the magician, he found himself obliged by hunger to go to a neighbouring town, and seek the means of support. In time he became independent, married, and brought up a family, but was gradually stripped of all his substance by losses, and buried his wife and children. One day he threw himself into the sea to bathe, and on lifting his head out of the water, found that he had only lifted it out of the basin, the magician and the other courtiers standing round. On his bitterly reproaching the magician, the latter assured him, and was confirmed by all the bystanders, that he had done nothing but just dip his head into the basin, and lift it out again. Of course the prince expressed no more doubts about the story of Mohammed; and however much any reader of the two tales may think that neither *is* true, a little reflection will show that either *might* be so. Perhaps the allegory might have been suggested by what is known to take place in dreams; there is evidence enough that many of the longest of these illusions really occupy no more than, if so much as, a second or two by the pendulum.

The actual measure of time depends upon our being able to secure successions of similar events which shall furnish epochs separated by equal intervals of time. We cannot do this by our thoughts, except approximately, and for short periods. The memory of a musician, aided by the sentiment or feeling of time which is part of a good ear for music, will do remarkably well for a short period: a person who could not well preserve the division of a second into eight parts at least would make a poor figure in an orchestra. As to the judgment of considerable periods of time, it is materially influenced by the manner in which it has been spent: a time which *seems* to have been long through weariness *has* been long, and the contrary, on grounds already alluded to. Thus a year of mature age is really, to the thoughts, of a different length from one of childhood. Again, when we talk of a long period of time having passed quickly or slowly, we speak not of the time, but of our mode of remembering it. A person of rapid recapitulation always says that time has passed quickly, another of a contrary habit the contrary; and this whether the rapidity is a consequence of quickness of ideas, or of having little to recall.

In all the more correct machines which have been invented to measure time, there is but one principle: a vibration is kept up by the constant application of forces only just sufficient to counteract friction and other resistances, and machinery is applied to register the number of vibrations. But the imperfections of such instruments, or rather our ignorance of the precise action of disturbing causes, and particularly of changes of temperature, renders them comparatively useless for measuring long periods, so that, if we could not have recourse to the motion of the heavenly bodies, there would be no permanent measure of time. And even in astronomical phenomena there is no absolute recurrence at equal intervals, though nearly enough for common purposes. The value of such phenomena for the most accurate measures consists in most of their irregularities being truly distributed about a uniform mean, so that the excesses of some periods are compensated by the defects of others, giving, in the long run, power of determining that mean with as much accuracy as our modes of measurement can appreciate. The determination of time for civil reckoning may be divided into two parts: first, the mode of making the different periods derived from the sun and moon agree with each other so as to afford an easy method of reckoning co-ordinately by both; secondly, the mode of procuring true and convenient subdivisions of the natural unit consisting of a day and night. To the second of these we now turn our attention.

The actual revolution of the earth, as measured by the time elapsed between two transits of the same star over the meridian, is called a *sidereal* day. It is

divided. as are all other days, into twenty-four hours of sixty minutes each, &c. The time so given is called sidereal time. If the sun were a fixed star, this sidereal time would be the common mode of reckoning. But the sun having its own slow motion in the ecliptic, in the same direction as the revolution of the earth, the interval between one meridian transit of that body and the next is longer than the simple revolution of the earth, for just the same reason that the time which the minute-hand of a watch moves from coincidence with the hour-hand to coincidence again is longer than the hour, or simple revolution of the minute-hand. If the sun moved uniformly, and in the equator, the real solar day, which means the interval between two meridian transits of the sun, would always be of the same length, and a little longer than the sidereal day. But the sun neither does move uniformly nor in the equator; and each of these circumstances causes a slight irregularity in the absolute length of the solar day, or, as it is called, the *real* solar day. This is the reason why the time shown by a sundial does not agree with the watch. To remedy this inconvenience, a fictitious sun is supposed to move in the ecliptic, and uniformly, while another fictitious sun moves in the equator, also uniformly. Both the fictitious bodies have the average motion of the real sun, so that the years of the three are the same; and the fictitious sun of the ecliptic is made to coincide with the real sun at the perigee and apogee, or nearest and farthest points from the earth; while the fictitious body in the equator is made to coincide with the fictitious body of the ecliptic at the equinoxes (from which it arises that there is also a coincidence at the solstices). This fictitious sun of the equator is that to which clocks are adjusted; the interval between two of its transits, which is always of the same length, is called a *mean solar day*, which is divided into twenty-four mean solar hours, &c. The difference between time as shown by the real sun and the fictitious sun in the equator is called the equation of time.

The determination of the equation of time is a mathematical problem of some complexity: what we have here to notice is, that, owing to the joint action of the two sources of difference, it presents a very irregular series of phenomena in the course of the year. If the sun moved regularly, but in the ecliptic, there would be no equation of time at the equinoxes and solstices: if the sun moved with its elliptic irregularity, but in the equator instead of the ecliptic, there would be no equation of time at the apogee and perigee. Between the two the equation of time vanishes only when the effect of one cause of irregularity is equal and opposite to that of the other; and this takes place four times a year. In this present year (1842) the state of the equation of time is as follows:—January 1, the clock is before the sundial $3^m\ 51^s$, and continues to gain upon the dial until February 11, when there is $14^m\ 35^s$ of difference. This then begins to diminish, and continues diminishing until April 15, when the two agree, and there is no equation. The dial then is before the clock until May 14, when the equation is $3^m\ 55^s$, which diminishes until June 15, when there is again no equation. The clock is now before the dial, and the equation increases till July 26, when the equation is $6^m\ 10^s$, which diminishes until the 1st of September, when there is no equation, for the third time. The dial is now again before the clock; and by November 2 the equation has become $16^m\ 18^s$, from which time it falls off until December 24, when it is nothing, for the fourth and last time. The clock then gets gradually before the dial till the end of the year. The phenomena of the next year present a repetition of the same circumstances, with some trivial variations of magnitude. There are several slight disturbing causes to which we have not thought it worth while to advert in a popular explanation: in particular, the slow motion of the solar perigee, which will in time wholly alter the phenomena. For instance, when the perigee comes to coincide with the equinox, there will be only two periods at which the equation of time vanishes, namely, when the sun is at either equinox.

The sidereal day is $23^h\ 56^m\ 4^s.09$ of a mean solar day, and the mean solar day is $24^h\ 3^m\ 56^s.55$ of a sidereal day.

ECONOMY OF SUPPLIES OF WATER BY MACHINERY AND HAND-CARRIAGE COMPARED.

[From Mr. Chadwick's Sanitary Report.]

Supplies of water obtained from wells by the labour of fetching and carrying it in buckets or vessels do not answer the purpose of regular supplies of water brought into the house without such labour, and kept ready in cisterns for the various purposes of cleanliness. The interposition of the labour of going out and bringing home water from a distance acts as an obstacle to the formation of better habits; and I deem it an important principle to be borne in mind, that, in the actual condition of the lower classes, conveniences of this description must precede and form the habits. It is in vain to expect of the great majority of them that the disposition, still less the habits, will precede or anticipate and create the conveniences. Even with persons of a higher condition, the habits are greatly dependent on the conveniences, and it is observed that, when the supplies of water into the houses of persons of the middle class are cut off by the pipes being frozen and when it is necessary to send for water to a distance, the house-cleansings and washings are diminished by the inconvenience; and every presumption is afforded that, if it were at all times requisite for them to send to a distance for water, and in all weathers, their habits of household cleanliness would be deteriorated. In Paris and other towns where the middle classes have not the advantage of supplies of water brought into the houses, the general habits of household and personal cleanliness are inferior to those of the inhabitants of towns who do enjoy the advantage. The whole family of the labouring man in the manufacturing towns rise early, before daylight in winter-time, to go to their work; they toil hard, and they return to their homes late at night. It is a serious inconvenience, as well as discomfort, to them, to have to fetch water at a distance out of doors from the pump or the river on every occasion that it may be wanted, whether it may be in cold, in rain, or in snow. The minor comforts of cleanliness are of course foregone, to avoid the immediate and greater discomforts of having to fetch the water. In general it has appeared in the course of the present inquiry that the state of the conveniences gives, at the same time, a very fair indication of the state of the habits of the population in respect to household and even personal cleanliness. The Rev. Whitwell Elwin, the chaplain of the Bath union, gives the following illustration of the habits of many of the working population even in that city, which is well supplied with water:—"A man had to fetch water from one of the public pumps in Bath, the distance from his house being about a quarter of a mile.—'It is as valuable,' he said, 'as strong beer. We can't use it for cooking, or anything of that sort, but only for drinking and tea.' 'Then where do you get water for cooking and washing?'—'Why, from the river. But it is muddy, and often stinks bad, because all the filth is carried there.' 'Do you then prefer to cook your victuals in water which is muddy and stinks, to walking a quarter of a

mile to fetch it from the pump?'—'We can't help ourselves, you know. We could not go all that way for it.' There are many gentlemen's houses in the same district in which the water is not fit for cooking; and I know that much privation and inconvenience is undergone to avoid the expense of water-carriage. I have often wondered to see the shifts which have been endured rather than be at the cost of an extra pail of water, of which the price was three halfpence. With the poor, far less obstacles are an absolute barrier, because no privation is felt by them so little as that of cleanliness. The propensity to dirt is so strong, the steps so few and easy, that nothing but the utmost facilities for water can act as a counterpoise; and such is the love of uncleanliness, when once contracted, that no habit, not even drunkenness, is so difficult to eradicate."

In most towns, and certainly in the larger manufacturing towns, those members of a family who are of strength to fetch water are usually of strength to be employed in profitable industry, and the mere value of their time expended in the labour of fetching water is almost always much higher than the cost of regular supplies of water even at the charge made by the water companies. In Glasgow the charge for supplying a labourer's tenement is 5*s.* per annum; in Manchester 6*s.* In London the usual charge is 10*s.* for a tenement containing two families, for which sum two tuns and a half of water per week may be obtained if needed. For 5*s.* per annum, then, as a water-rate (on which from 10 to 20 per cent. is paid to [by] the owner for collection), each labourer's family may be supplied in the metropolis with one tun and a quarter of water weekly, if they find it necessary to use so much. The tun is 216 gallons, equal to 108 pailfuls, at two gallons the pail. Thus for less than one penny farthing, 135 pailfuls of water are taken into the house without the labour of fetching, without spilling or disturbance, and placed in constant readiness for use. Under any circumstances, if the labourer or his wife or child would otherwise be employed, even in the lowest-paid labour or in knitting stockings, the cost of fetching water by hand is extravagantly high as compared with the highest cost of water lifted by steam and conducted through iron pipes at a large expenditure of capital (the lowest in London is about 200,000*l.*) and by an expensive management. In illustration of the difference in economy of the two modes of conveyance, I may mention that the usual cost of filtered water carried into the houses at Paris by the water-carriers is two sous the pailful, being at the rate of 9*s.* per tun; whilst the highest charge of any of the companies in London for sending the same quantity of water to any place within the range of their pipes, and delivering it at an average level of 100 feet, at the highest charge, is 6*d.* per tun.

At the highest of the water companies' charges it would be good economy for the health of the labourer's family to pay for water being laid on in the house, to reduce the expense of medicines and loss of work in the family, as indicated by any of the tables of sickness. The cost of laying on the water in a labourer's tenement, and providing a butt or receptacle to hold it, may be stated to be on an average 40*s.*, which will last twenty years.

The Markets in St. Petersburg.—Not only is everything brought in sledges to market, but the sledges serve at the same time for shops and counters. The mats which cover the goods are thrown back a little, and the pieces of geese, fowls, and calves are ranged on the edge, and hung up at the corners and on the tops of the posts. The geese are cut up into a hundred pieces; the necks are sold separately, the legs separately, the heads and rumps separately, each in dozens and half-dozens strung together. Whoever is too poor to think of the rump, buys a string of frozen heads, and he who finds the heads too dear gives six copecks for a lot of necks, while he who cannot afford these makes shift with a couple of dozen feet, which he stews down on Sunday into a soup for his family. The sledges with oxen, calves, and goats have the most extraordinary appearance. These animals are brought to market perfectly frozen. Of course they are suffered to freeze in an extended posture, because in this state they are most manageable. There stand the tall figures of the oxen, like blood-stained ghosts, lifting up their long horns, around the sides of the sledge; while the goats, looking exactly as if they were alive, only with faint, glazed, and frozen eyes, stand threateningly opposite to one another. Every part is hard as stone. The carcases are cut up, like trunks of trees, with axe and saw. The Russians are particularly fond of the sucking pig, and whole trains of sledges laden with infant swine come to the market. The little starvelings, strung together like thrushes, are sold by the dozen, and the long-legged mothers keep watch over them around the sledge. The anatomy of the Russian butcher is a very simple science. For, as every part, flesh or bone, is alike hard, they have no occasion to pay regard to the natural divisions of the joints. With the saw they cut up hogs into a number of steaks, an inch or two inches thick, as we do a rump of beef. The flesh splits and shivers during the operation like wood, and the little beggar wenches are very busy picking up the animal sawdust out of the snow. You do not ask for a steak, a chop, a joint, but for a slice, a block, a lump, a splinter of meat. The same is the case with fish; they too are as if cut out of marble and wood. Those of the diminutive species, like the smitki, are brought in sacks, and they are put into the scales with shovels. The large pike, salmon, and sturgeon, every inch of which was once so lithe and supple, are now stiffened as if by magic. To protect them from the warmth, in case of sudden thaw—for thawing would essentially deteriorate their flavour—they are covered with snow and lumps of ice, in which they lie cool enough. It is not uncommon for the whole cargo to be frozen into one mass, so that crowbar and pincers are required to get at individual fish. So long as the cold in winter keeps every fluid congealed, and the snow covers every impurity with a white carpet, this Haymarket is tolerably clean, and you cannot pick up much dirt that may not easily be removed. All offal that is thrown away is instantly frozen to the ground. Hence there is formed in the course of the winter such an accumulation of sheeps' eyes, fish tails, crabs' shells, goats' hair, hay, dung, fat, blood, &c., that, when spring strips off the covering kindly lent by winter, the place is like a real Augean stable.—*Kohl's Russia and the Russians.*

Demands of Increased Annual Population.—It may be of interest to observe that, as the whole population grows in age, the annual increase in numbers may be deemed to be equivalent to an annual increase of numbers of the average ages of the community. If they were maintained on the existing average of territory to the population in England, the additional numbers would require an annual extension of one fifty-seventh of the present territory of Great Britain, possessing the average extent of roads, commons, hills, and unproductive land. The extent of new territory required annually would form a county larger than Surrey, or Leicester, or Nottingham, or Hereford, or Cambridge, and nearly as large as Warwick. To feed the annually increased population, supposing it to consume the same proportions of meat that is consumed by the population of Manchester and its vicinity (a consumption which appears to me to be below the average of the consumption in the metropolis), the influx of 230,000 of new population will require for their consumption an annual increase of 27,327 head of cattle, 70,319 sheep, 64,715 lambs, and 7894 calves, to raise which an annual increase of upwards of 81,000 acres of good pasture-land would be required. Taking the consumption of wheat or bread to be on the scale of a common dietary, *i.e.* 56 oz. daily for a family of a man, woman, and three children, then the annual addition of supply of wheat required will be about 105,000 quarters, requiring 28,058 acres of land, yielding 30 bushels of wheat to an acre: the total amount of good land requisite for raising the chief articles of food will therefore be in all about 109,000 acres of good pasture-land annually. If the increase of production obtained by the use of the refuse of Edinburgh (that is, of 3900 oxen from one quarter of the refuse of Edinburgh) be taken as the scale of production obtainable by appropriate measures, the refuse of the metropolis alone that is now thrown away would serve to feed no less than 218,288 oxen annually, which would be equivalent to the produce of double that number of acres of good pasture-land.—*Mr. Chadwick's Sanitary Report.*